



Architecture Best Practices for Project and Technical Leaders

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

Felix Bachmann
Jim McHale
Tim Morrow
11/5/14



Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 05 NOV 2014		2. REPORT TYPE		3. DATES COVERED 00-00-2014 to 00-00-2014	
4. TITLE AND SUBTITLE Architecture Best Practices for Project and Technical Leaders				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Carnegie Mellon University, Software Engineering Institute, Pittsburgh, PA, 15213				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

This material is based upon work funded and supported by the Department of Defense under Contract No. FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

NO WARRANTY. THIS CARNEGIE MELLON UNIVERSITY AND SOFTWARE ENGINEERING INSTITUTE MATERIAL IS FURNISHED ON AN "AS-IS" BASIS. CARNEGIE MELLON UNIVERSITY MAKES NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, AS TO ANY MATTER INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PURPOSE OR MERCHANTABILITY, EXCLUSIVITY, OR RESULTS OBTAINED FROM USE OF THE MATERIAL. CARNEGIE MELLON UNIVERSITY DOES NOT MAKE ANY WARRANTY OF ANY KIND WITH RESPECT TO FREEDOM FROM PATENT, TRADEMARK, OR COPYRIGHT INFRINGEMENT.

This material has been approved for public release and unlimited distribution except as restricted below.

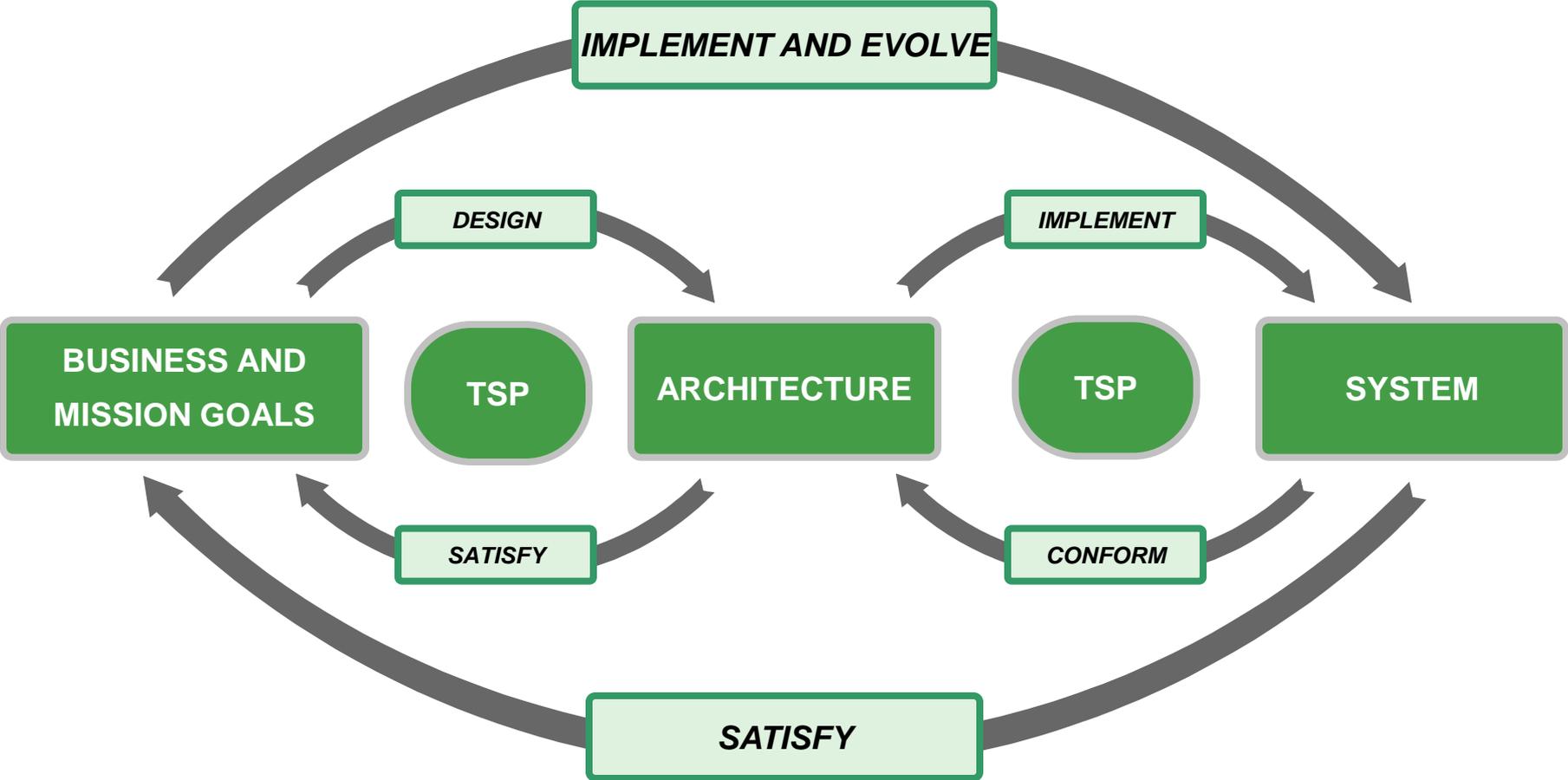
This material may be reproduced in its entirety, without modification, and freely distributed in written or electronic form without requesting formal permission. Permission is required for any other use. Requests for permission should be directed to the Software Engineering Institute at permission@sei.cmu.edu.

Architecture Tradeoff Analysis Method® and ATAM® are registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

DM-0001850



Architecture-Centric Engineering (ACE) Design and Analysis – with TSP



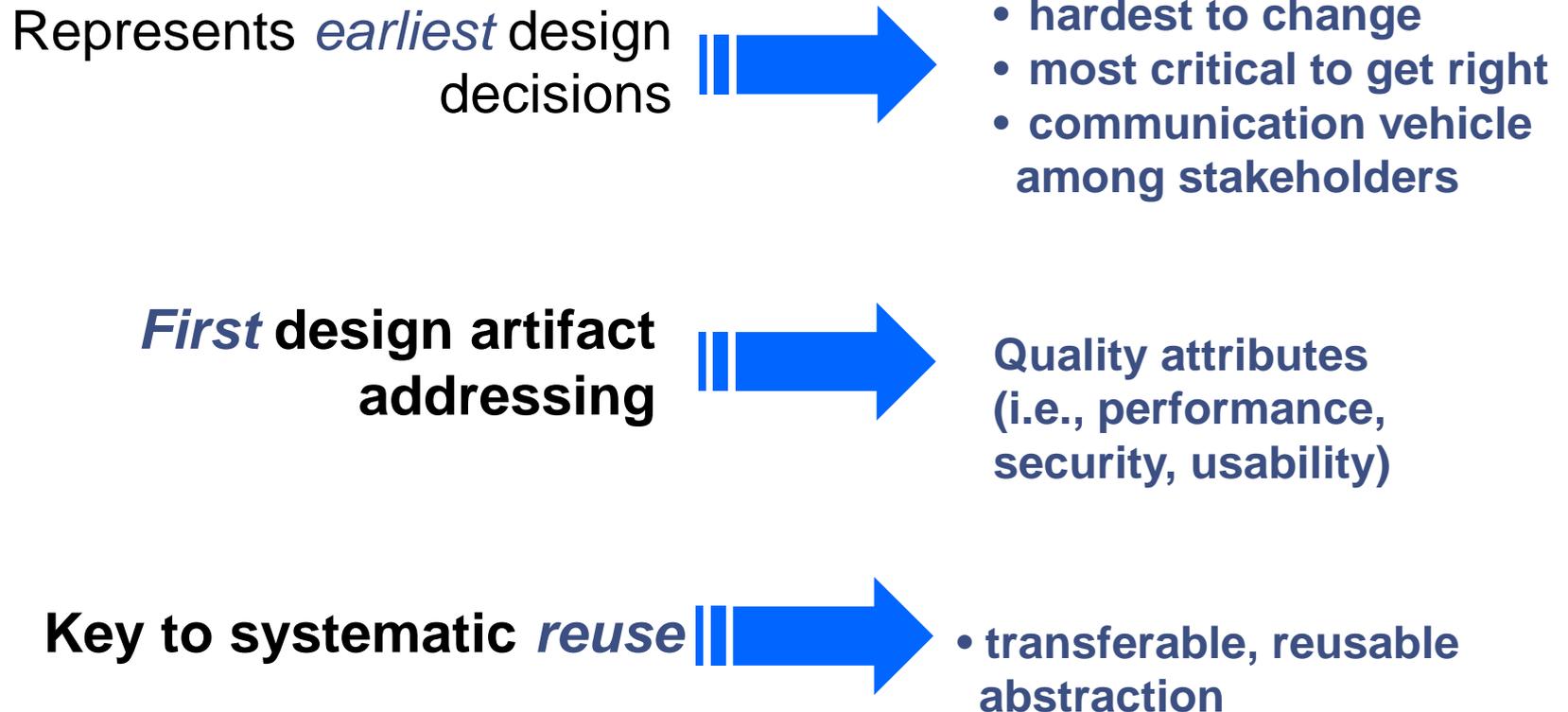
What Drives Architectural Need?

There are no definitive studies or guidelines, probably because the answer is context dependent.

- ❑ More than 2 people
- ❑ More than 6 months effort
- ❑ More than 25-30 KLOC (thousands of lines of code; a VERY high number for 2 people over 6 months)
- ❑ Critical non-functional attributes (performance, safety, security, etc.)
- ❑ *No pre-existing architecture!* (...especially if someone other than the developer is attempting to maintain or enhance it)



Why is Architecture Needed?



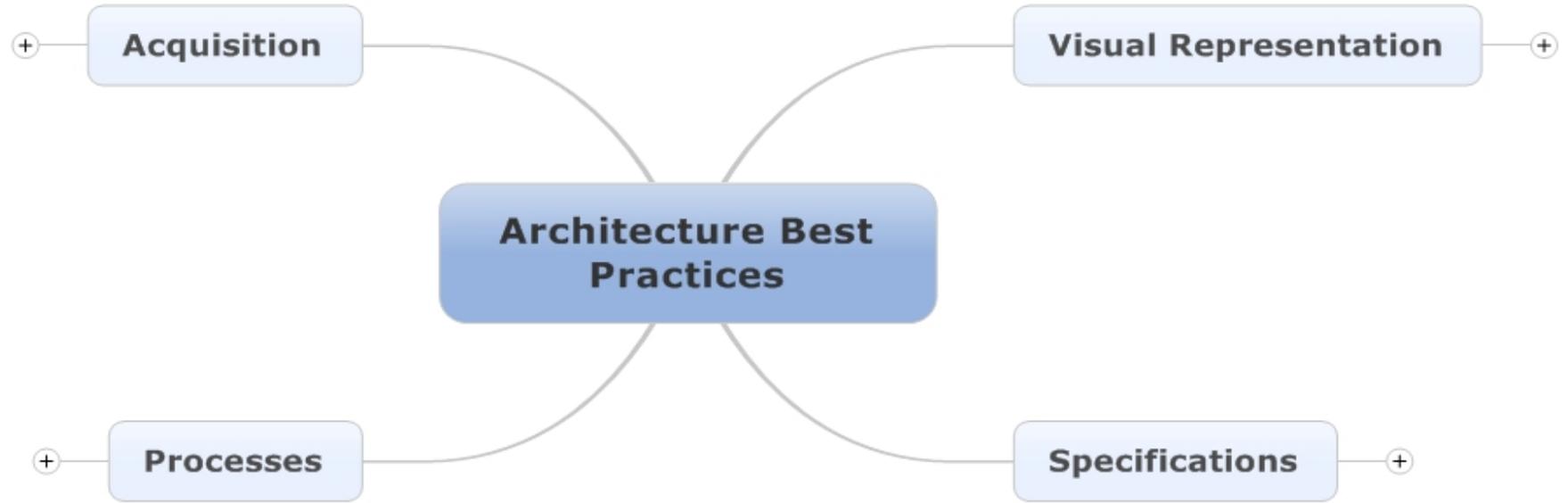
What do I need to know?

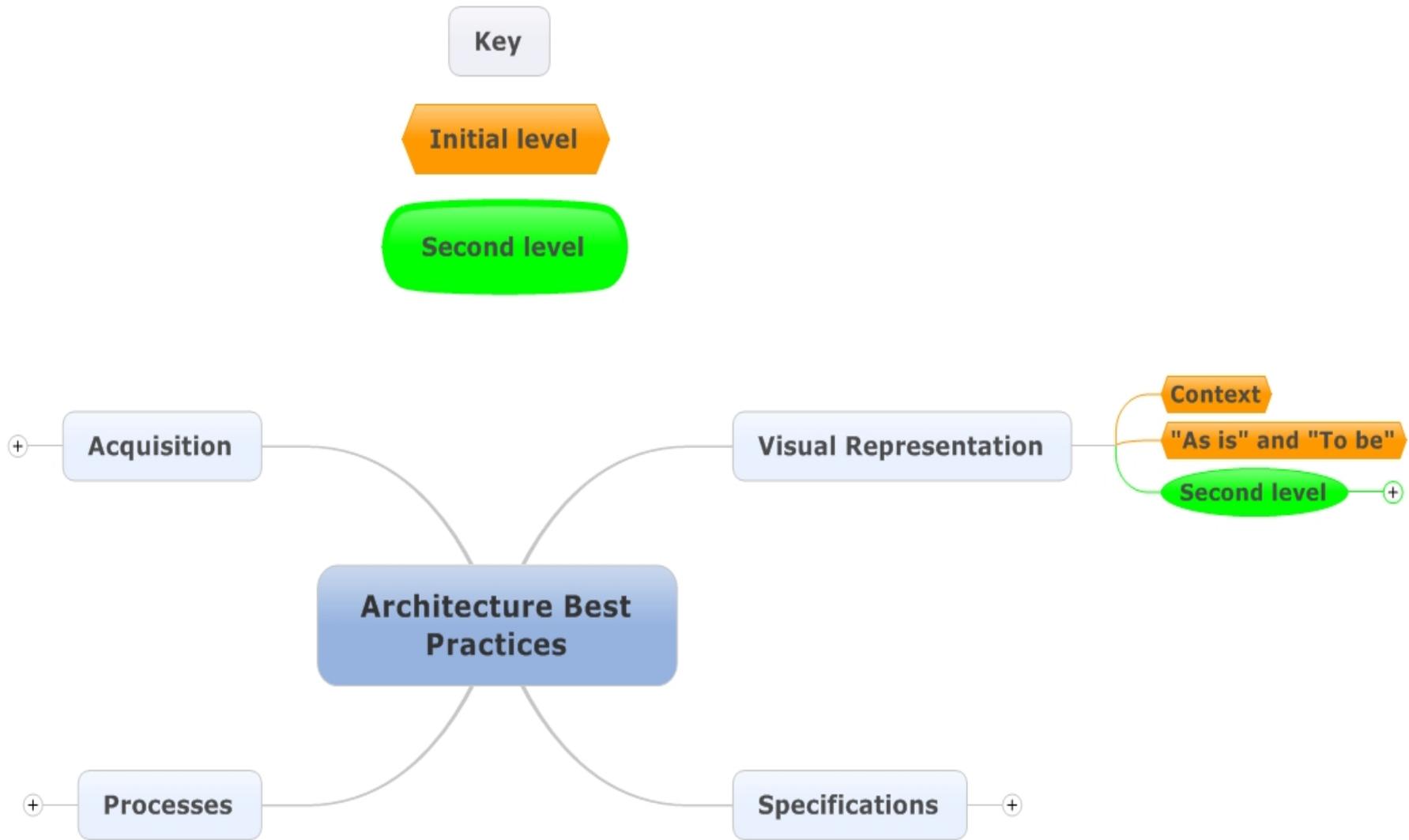


Key

Initial level

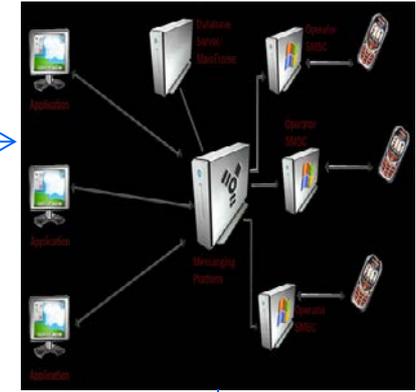
Second level







Carriers' Gateway



First Responders

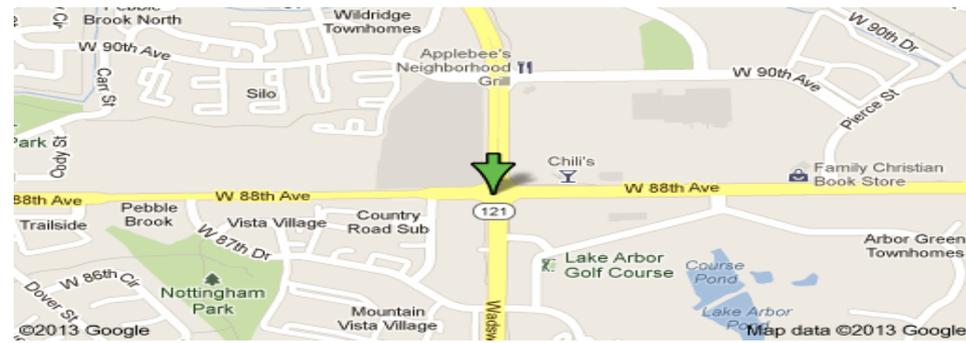
Local govt

Emergency Alerting System

Social media

Message Recipient

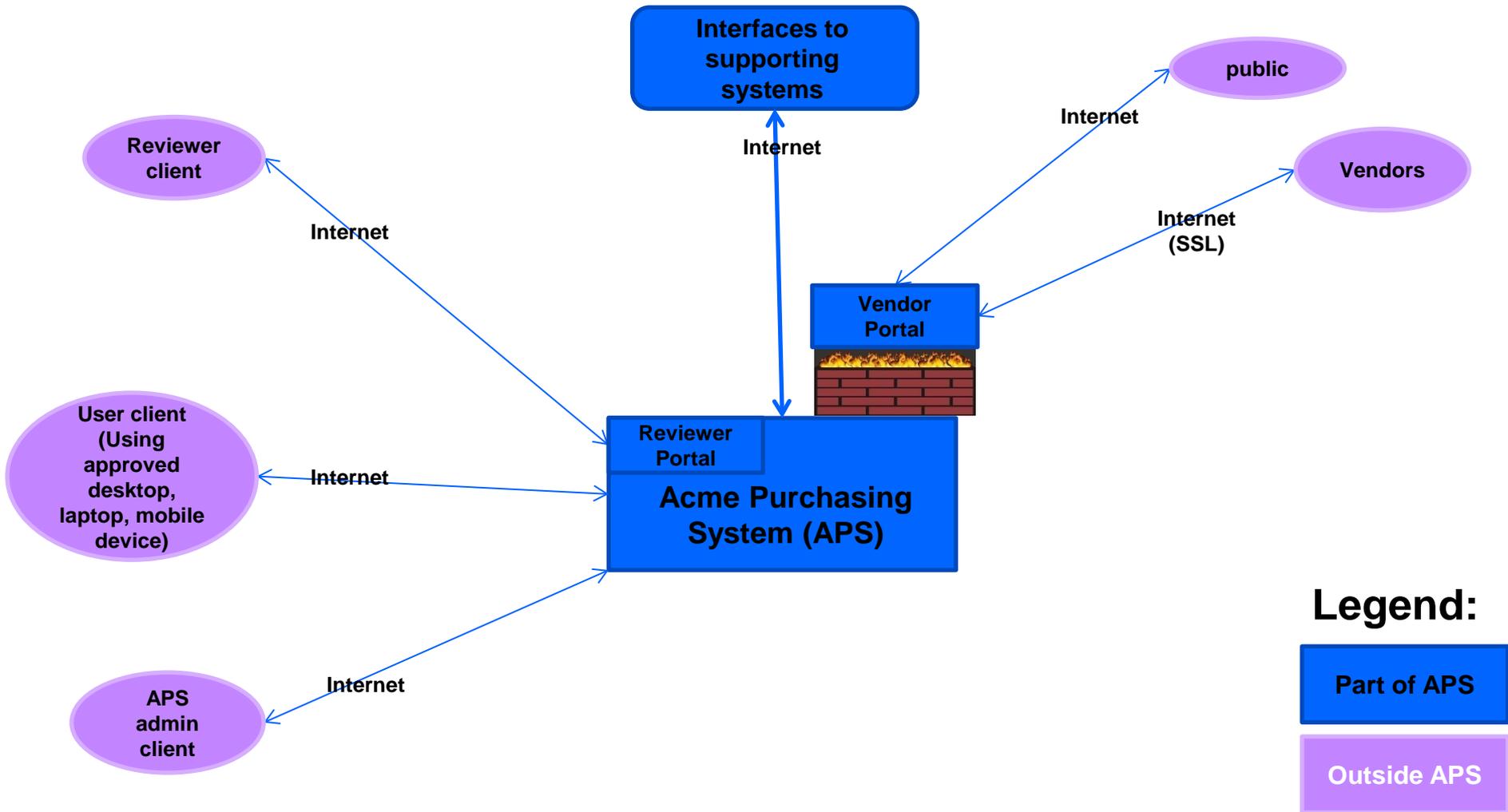
Emergency Management Organization



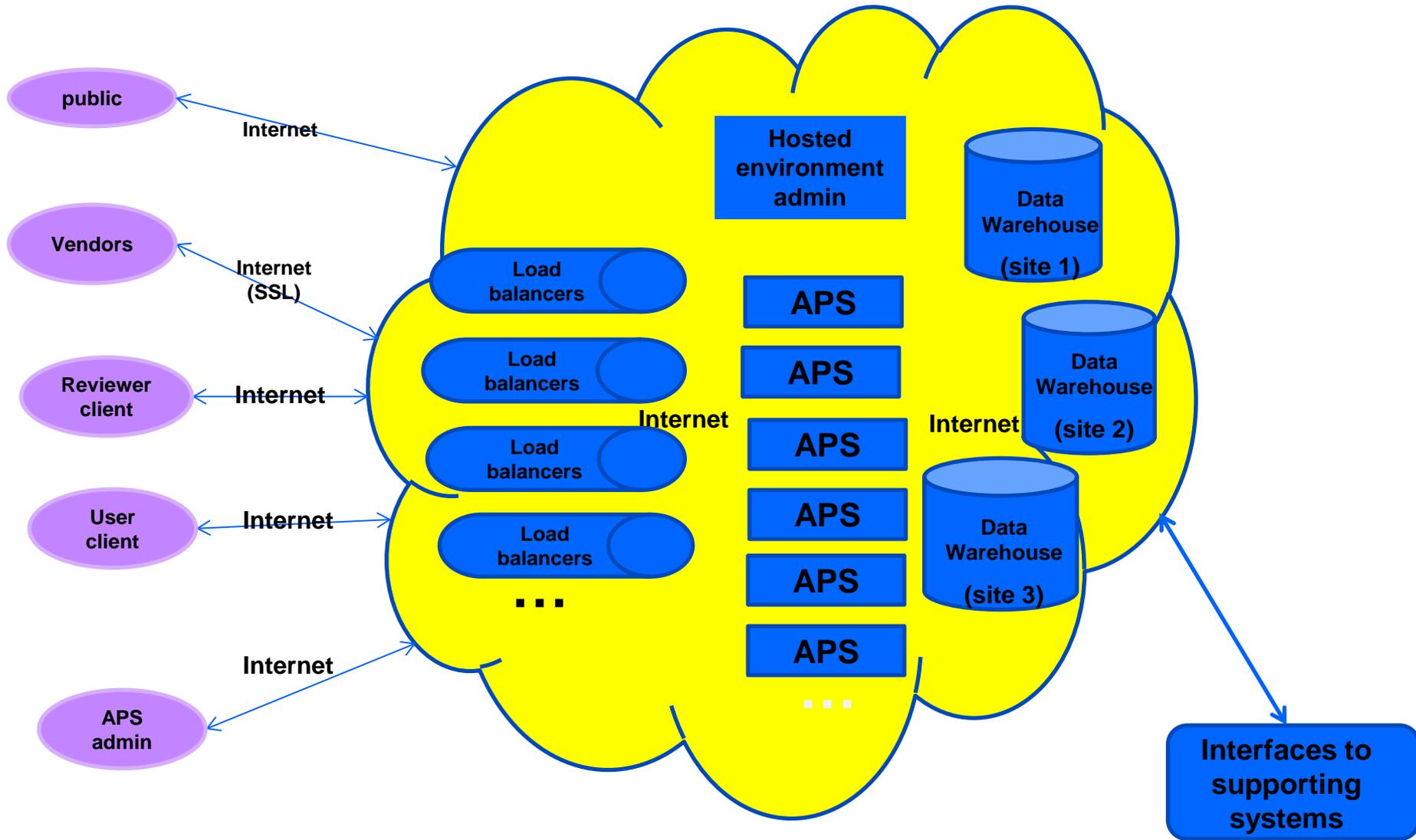
Citizen calls 911

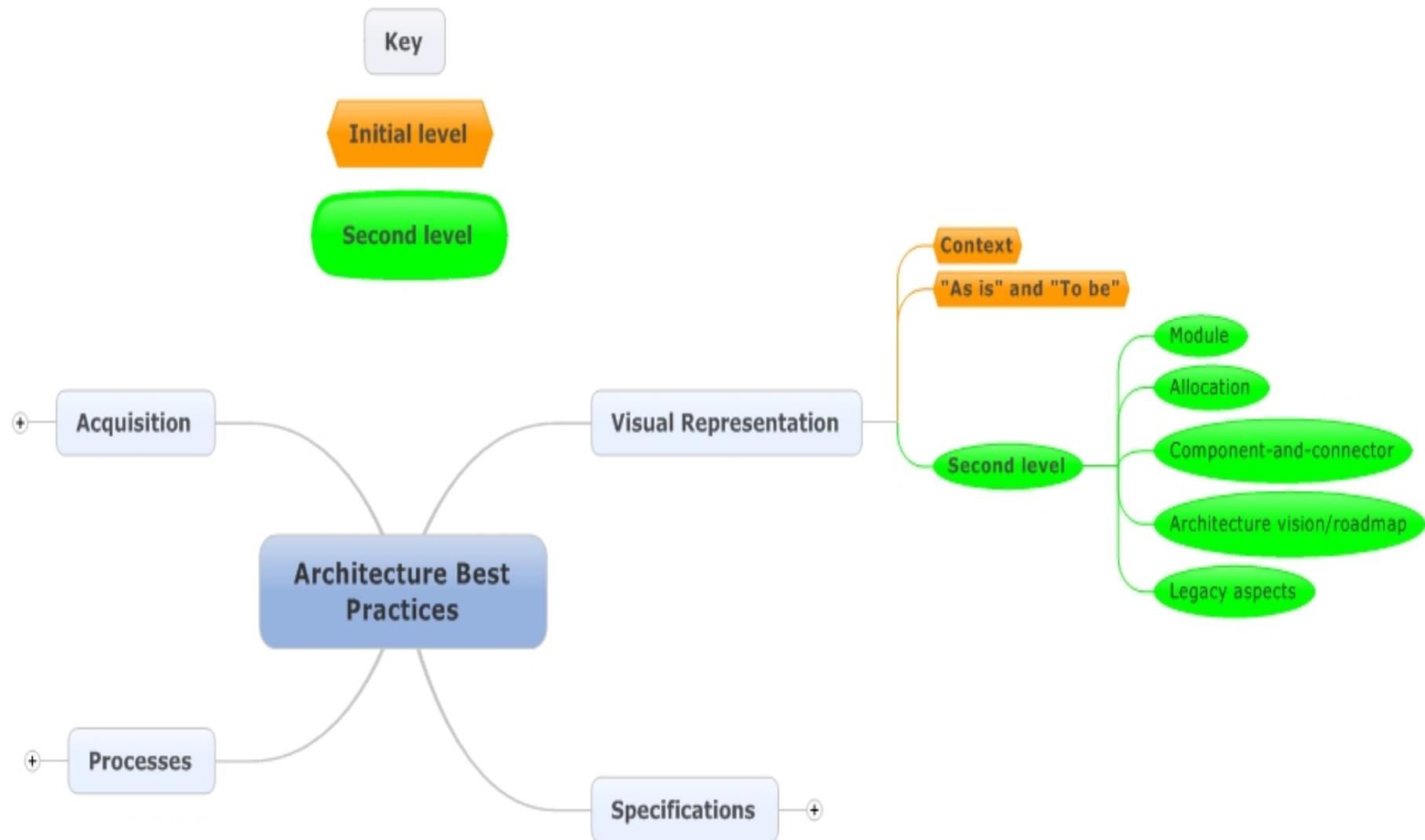


“As-Is” Standalone Implementation

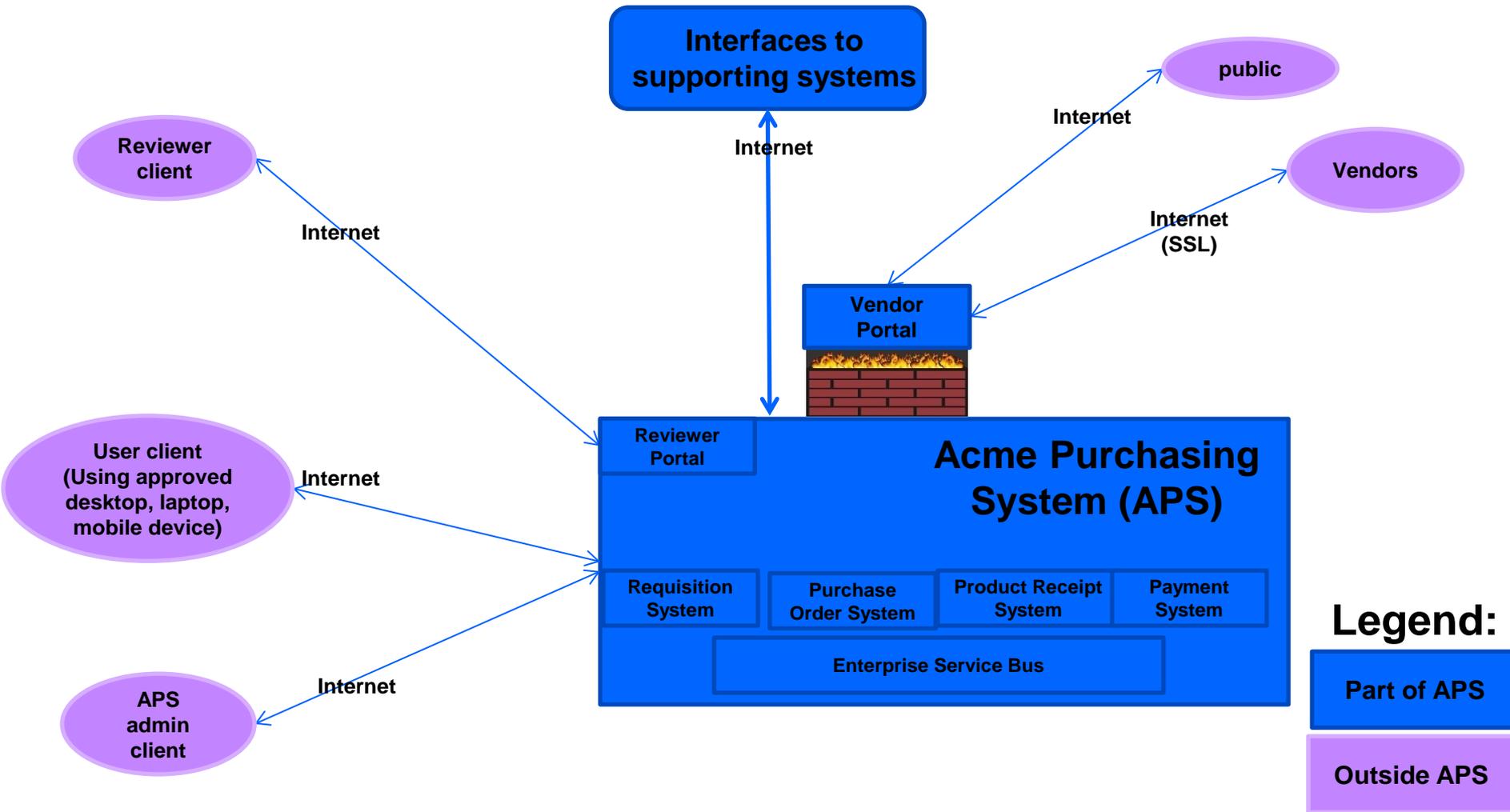


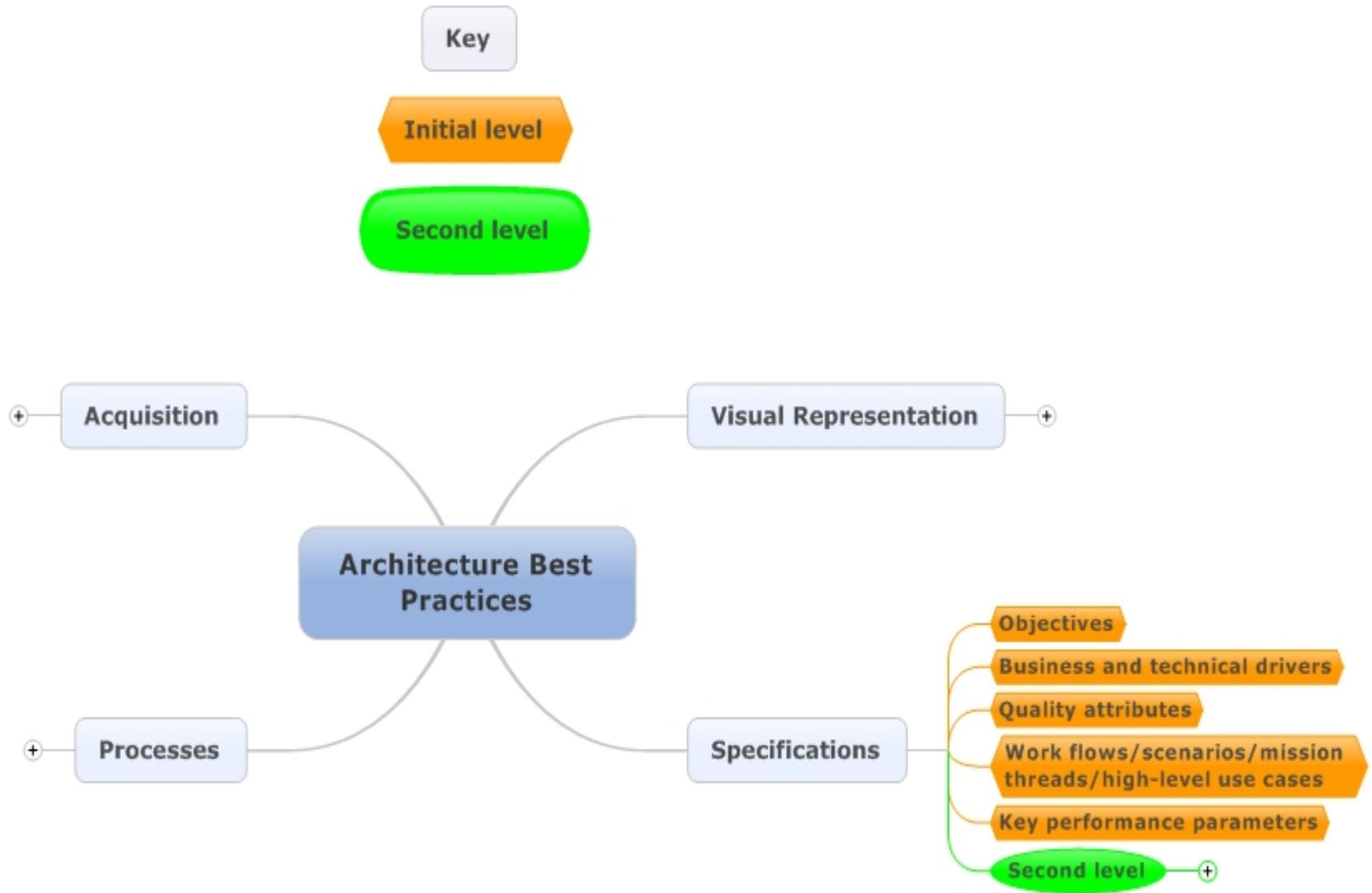
“To-be” Hosting view

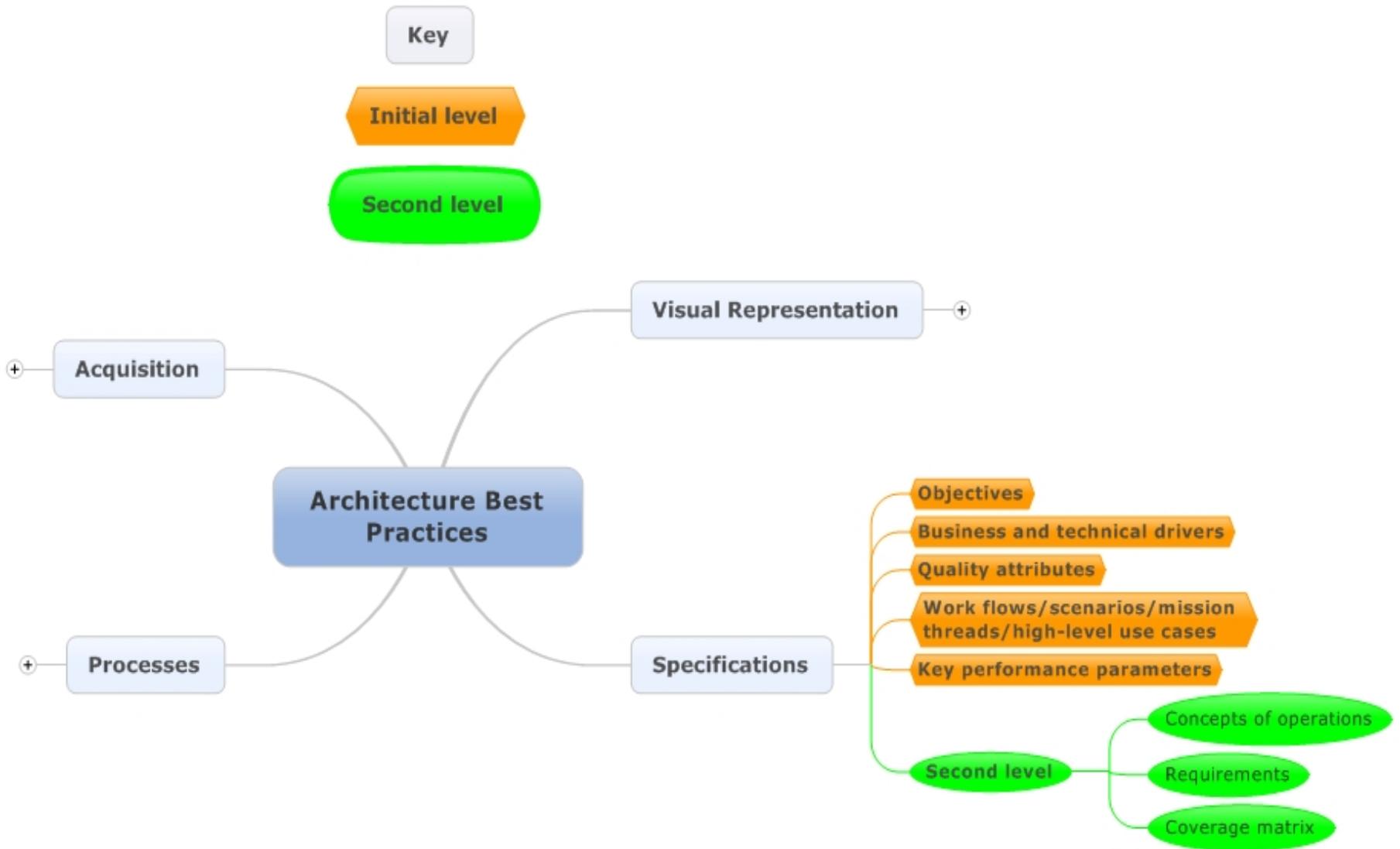


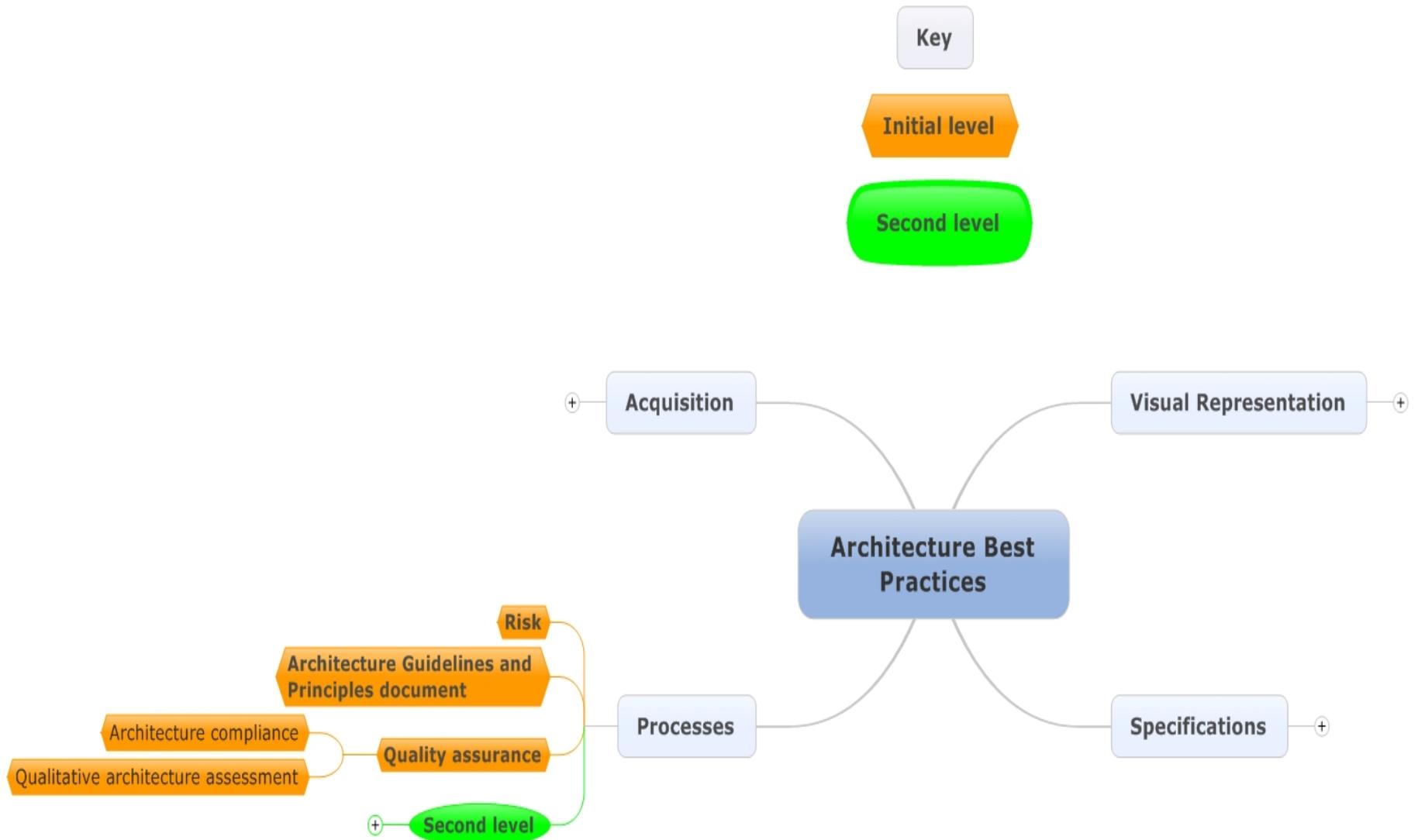


APS Decomposition View









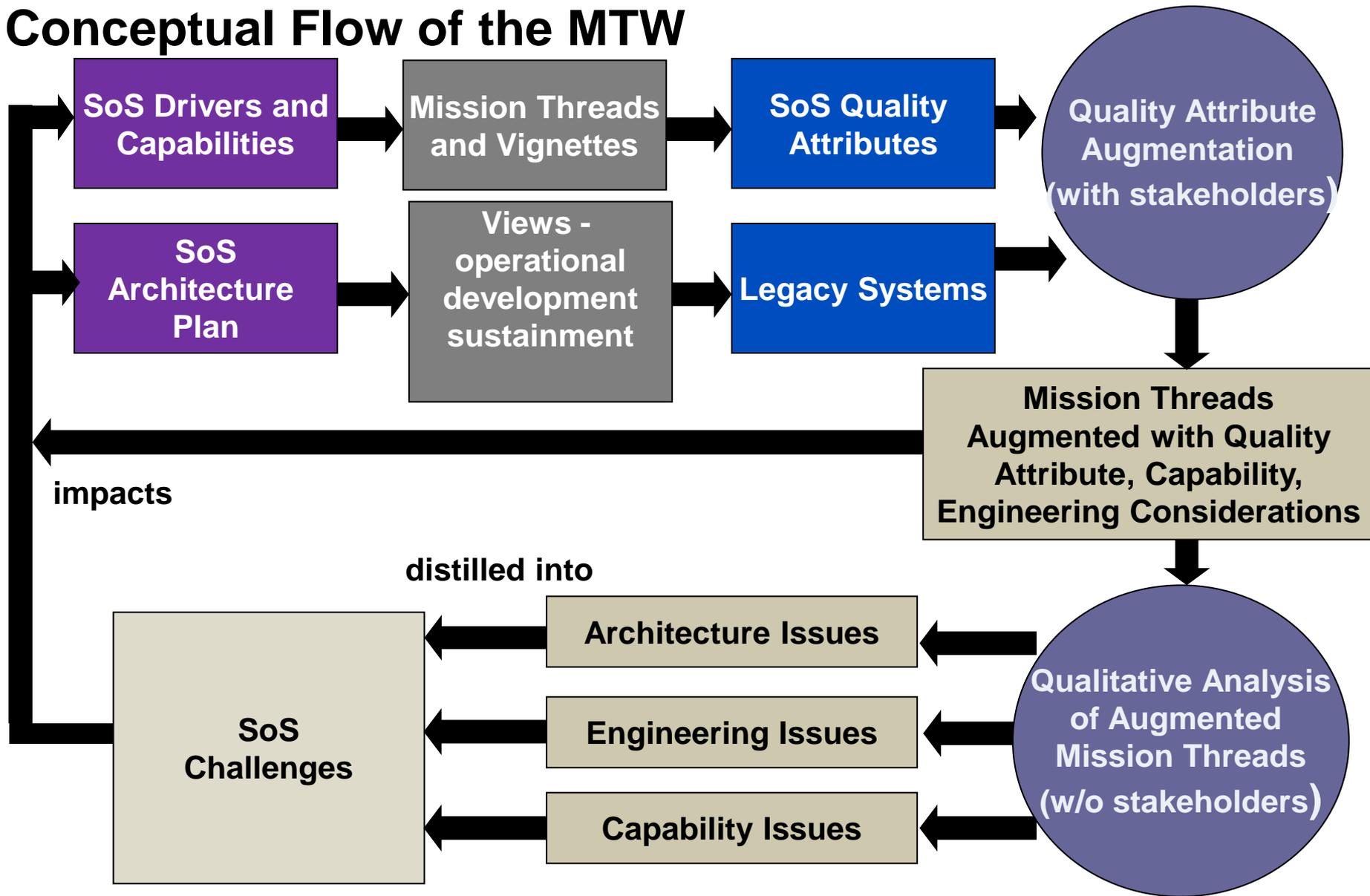
Architecture Guidelines & Principles Document

Table of Contents

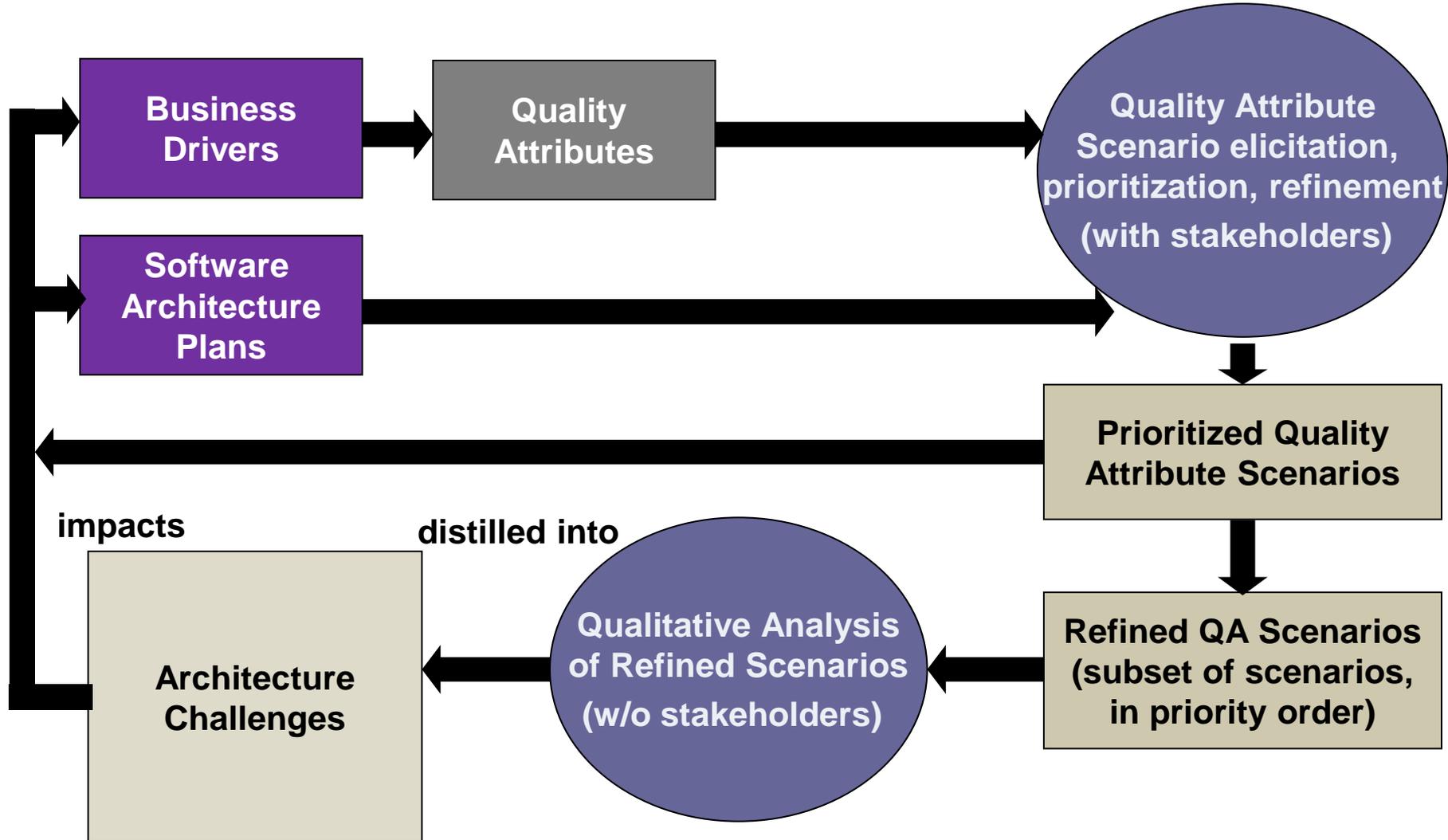
- Timeline
- Quality Attributes
- Guidelines
- Strategies
- Constraints
- Design/Coding Guidance
- Architecture Evolution
- Decisions

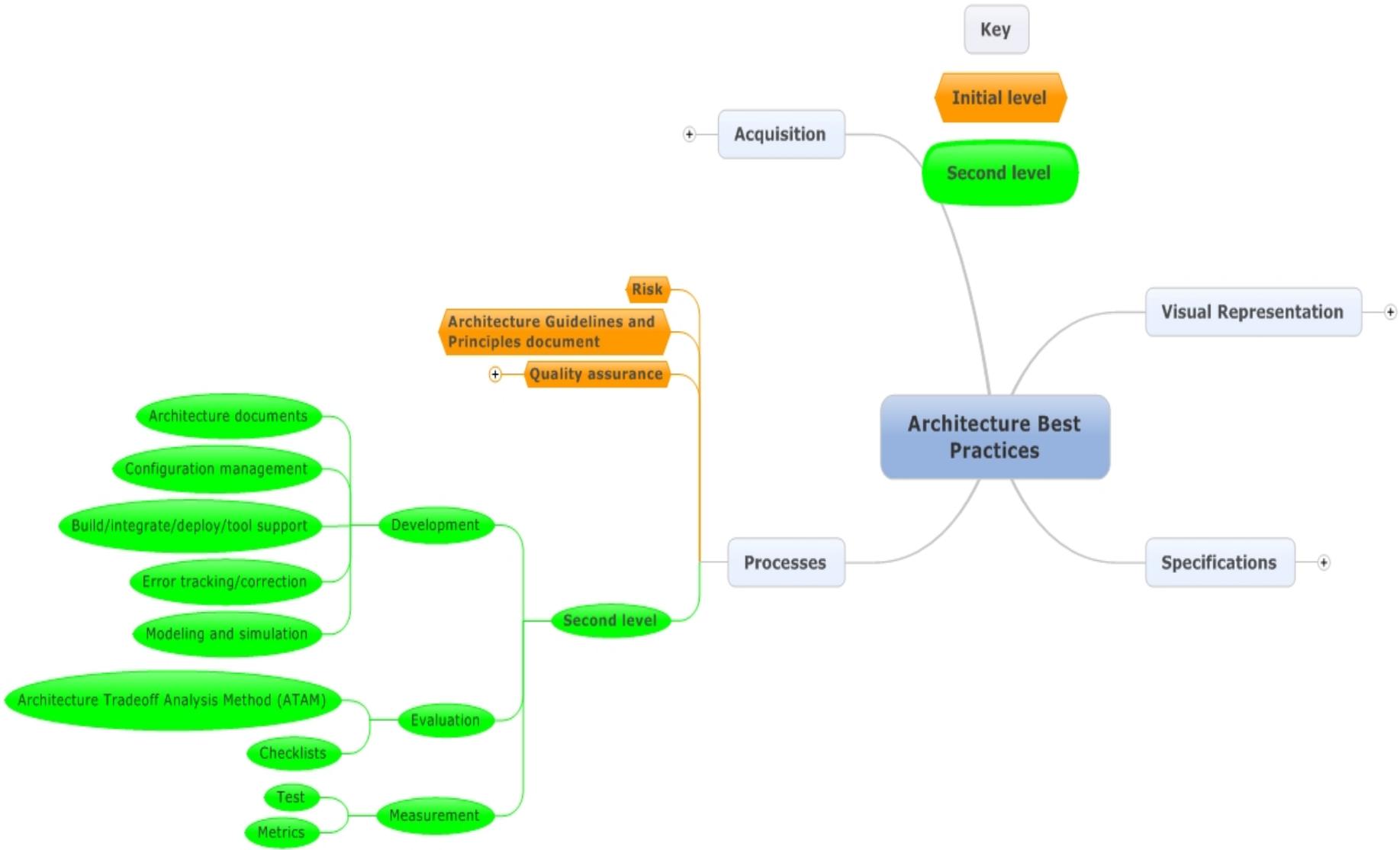


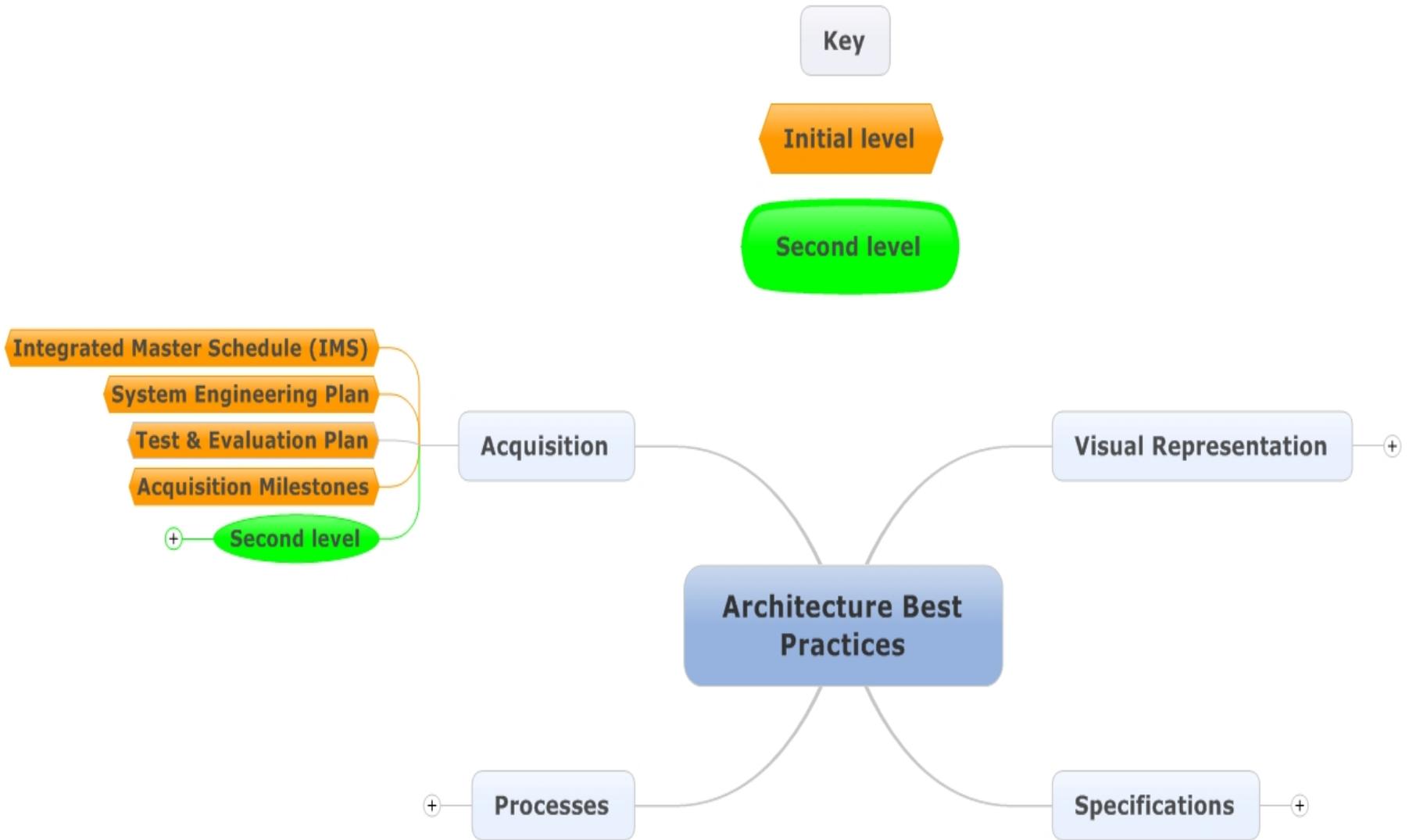
Conceptual Flow of the MTW

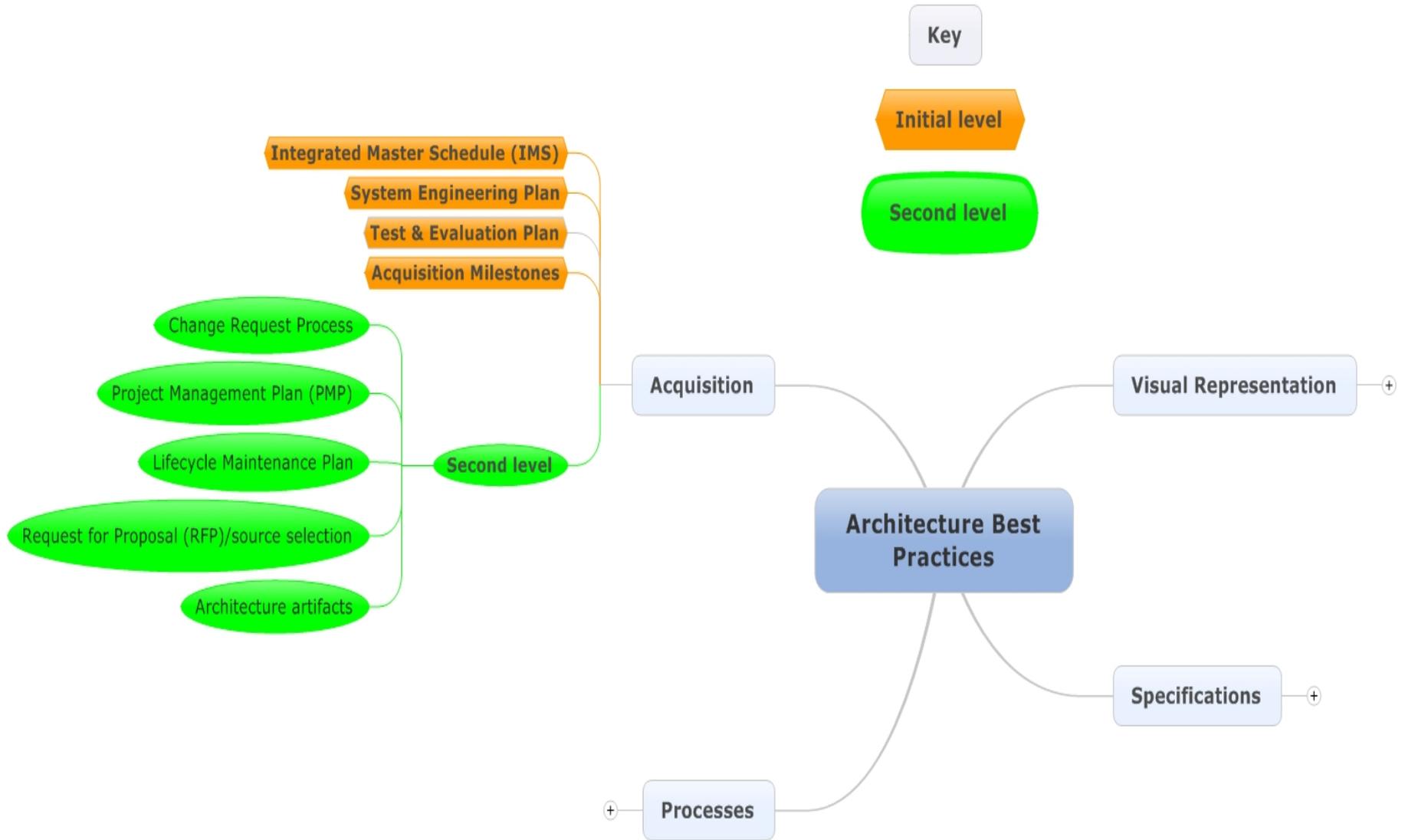


Conceptual Flow of the QAW









System Engineering Timeline



Contact Information

Jim McHale/Tim Morrow

Senior Members of Technical Staff

SEI Software Solutions Division

Telephone: +1 412-268-5800

Email: jdm@sei.cmu.edu

tbm@sei.cmu.edu

U.S. Mail

Software Engineering Institute

Customer Relations

4500 Fifth Avenue

Pittsburgh, PA 15213-2612

USA

Web

www.sei.cmu.edu

www.sei.cmu.edu/contact.cfm

Customer Relations

Email: info@sei.cmu.edu

Telephone: +1 412-268-5800

SEI Phone: +1 412-268-5800

SEI Fax: +1 412-268-6257

